Revisions in State Establishment-Based Employment Estimates Effective January 2001

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With the release of estimates for January 2001, nonfarm payroll employment, hours, and earnings data for States and areas (tables B-7, B-14, and B-18) were revised to reflect the incorporation of March 2000 benchmarks, and the recomputation of seasonal adjustment factors (State estimates). The revisions affected all unadjusted data from April 1999 forward and the seasonally adjusted State estimates from January 1996 forward. This article provides some background on benchmarking methods, detailed information on the effects of the March 2000 benchmark revisions, and some historical perspective. The article also describes the introduction of probability-based sample estimates for the wholesale trade component of the trade industry for the State and area data.

Benchmark methods

The Current Employment Statistics (CES), or nonfarm payroll, survey is a Federal/State cooperative program that provides employment, hours, and earnings estimates for States and areas on a timely basis by estimating the number of jobs in the population from a sample of that population. As in other sample surveys, estimates in the CES are subject to both sampling and nonsampling error. Sampling error is an unavoidable byproduct of forming an inference about a population based on a sample. The larger the sample is relative to the population, the smaller the sampling error. The sample-to-population ratio varies across States and industries. Nonsampling error is not unique to sample surveys, as it includes errors in reporting and processing.

To help control both sampling and nonsampling error, the estimates are benchmarked annually to universe employment counts. These counts are derived primarily from employment data reported on unemployment insurance (UI) tax reports that nearly all employers are required to file with State Employment Security Agencies. Benchmark levels replace the original sample-based estimates from April of the previous year to March of the benchmark year for each month. For the current 2000 benchmark, estimates from April 1999 to March 2000 were replaced with UI-based universe counts. (New Jersey, now on the March 2000 benchmark, revised data to July 1998 as a result of changes to its UI system.) Once the new level for March 2000 had been determined, the appropriate sample links were applied to the new level, and the estimates were recalculated for April 2000 forward. The sample links capture the over-the-month change of the sample estimates. A sample link for a given month is calculated by dividing employment reported by survey respondents for that month by employment reported by those same respondents for the previous month. The links used during the benchmark process may differ slightly from those used to derive the original estimates, because they include data from respondents that reported too late for inclusion in the previously published estimates. This process was completed, and the revised data were released with the January 2001 estimates.

Improvements in the receipt of UI data and in the standardization of State operations have enabled nearly all States to replace estimates with UI data beyond March of the benchmark year. In the March 2000 benchmark, 7 States used third-quarter 2000 UI data (that is, through September 2000) in their benchmarking; 41 States and the District of Columbia used second-quarter 2000 UI data (through June 2000); and 2 States used first-quarter 2000 data (through March 2000). Recalculated sample links were then applied to these new levels to derive revised estimates for months after the replacement quarter.

Benchmark revisions

The percentage differences between March 2000 sample-based estimates and the revised March 2000 benchmark levels are commonly used to report the magnitude of the revisions. The average absolute percentage revision for State total nonfarm estimates was 0.7 percent for March 2000. This is slightly higher than the revisions for the last 5 years, when average absolute differences were 0.5 percent or smaller. The range of the percentage revisions for the States, at the total nonfarm level, was from -1.1 percent to 3.3 percent in 2000. Across the major industry divisions that make up total nonfarm employment, government had the lowest average absolute revision, 0.7 percent. Mining and construction had the highest revisions, with average absolute revisions of 4.4 and 3.3 percent, respectively. (See table 1.)

The direction of the revisions indicates whether the March 2000 benchmark levels were greater or less than the original sample-based estimates. Historically, State estimates have underestimated March employment levels during periods of economic growth and overestimated these levels during periods of economic decline. For the current bench-

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mark, 36 States and the District of Columbia revised total nonfarm employment upward, while 14 States had downward revisions. (See table 2.) This widespread underestimation of employment is reflected by the mean 0.4-percent revision across all States for total nonfarm employment.

For metropolitan statistical areas (MSAs) published by the CES program, the range of percentage revisions is from -4.3 to 6.0 percent, with an average absolute percentage revision of 1.1 percent across all MSAs.[1] This compares with a range of -1.1 to 3.3 percent and an average absolute percentage revision of 0.7 percent at the State level. Generally, as the size of the MSAs decrease, the range of percentage revisions increases, as does the average absolute percentage revision. (See table 3.) Metropolitan areas with 1 million employees or more had an average absolute revision of 0.8 percent, while metropolitan areas with fewer than 100,000 employees had an average absolute revision of 1.4 percent.

Introduction of State and area CES program sample redesign for wholesale trade

At its inception over 60 years ago, the original CES survey was based on a quota sample. Quota samples are now known to be at risk for potentially significant biases. Limitations of the quota sample design at times have contributed to large benchmark revisions and to a lack of consistency between national and sum-of-the-States employment trends. Introducing a probability-based sample more effectively ensures a proper representation of the universe of nonfarm business establishments through randomized selection techniques and improved estimation methodology. The redesign thus corrects a longstanding limitation of the CES sample.

The redesign results in a new sample composition, new estimation formula, and use of a net birth/death modeling technique to account for movements not captured in the sample. Finally, the redesign allows, for the first time, the calculation of sampling errors and confidence intervals—standard survey accuracy measures not available with a quota sample.[2]

The March 2000 benchmark revisions reflect the incorporation of the CES sample redesign for the State and area wholesale trade series only; the sample redesign for other series will be phased in over the next 2 years. The monthly wholesale trade series have been recomputed from the postbenchmark period of July-December 2000 forward using the new sample, weights, estimators, and net birth/death models. There are no series breaks or discontinuities from the transition because the employment series continue to be anchored to the UI universe-based levels.

The schedule for conversion to probability-based esti-

[1] The CES program published employment series for 272 MSAs in 2000. As of the March 2000 benchmark revision, CES began to publish employment series for two new areas in Montana: Billings and Missoula. The list of BLS standard MSAs is available at **http://www.bls.gov/790msa.htm**.

[2] For a more comprehensive discussion of the CES sample redesign, see the CES sample redesign section of the Establishment Data portion of the Explanatory Notes and Estimates of Error section at the end of this publication.

Table 1. **Differences between State employment estimates and benchmarks by industry, March 1995-2000**

Industry	1995	1996	1997	1998	1999	2000
	Average absolute percentage differences					
Total nonfarm	0.5	0.5	0.4	0.5	0.5	0.7
Mining	6.0	3.3	4.2	3.1	5.3	4.4
Construction	3.1	2.8	2.4	2.5	2.5	3.3
Manufacturing	1.3	1.0	.8	.8	1.0	1.6
Transportation and public utilities	1.6	1.4	1.4	1.3	1.8	1.7
Wholesale and retail trade	1.0	1.3	.6	.8	.9	1.1
Finance, insurance, and real estate	1.7	1.4	1.3	1.5	1.8	1.4
Services	1.3	1.1	.9	1.0	1.1	1.2
Government	1.0	1.1	.7	.9	.7	.7
	Average percentage revisions					
Total nonfarm:						
Range	-1.7 : 1.5	-3.0 : 1.7	-1.3 : 1.3	-1.2 : 2.5	-1.3 : 1.8	-1.1 : 3.3
Mean	.4	-.2	.2	.1	.1	.4
Standard deviation	.9	.7	.5	.7	.6	.8

NOTE: The range indicates the lowest and highest percentage revision at the total nonfarm level. The mean is the sum of all the items in a series divided by the number of items. The standard deviation is a widely used measure of dispersion. It measures the extent to which the individual items in a series are scattered about the mean of the series and indicates the reliability of the mean. For example, the March 1997 standard deviation (.5) is low, relative to that for March 1995 (.9). This is an indication that there is higher variation among State total nonfarm revisions in March 1995 (that is, the mean is less representative of the group) than in March 1997 (that is, the mean is more representative of the group). The standard deviation is found by taking the difference of each item in a series from the mean of the series, squaring each difference, summing the squared differences, dividing the result by the number of items, and obtaining the square root of that figure.

Table 2. **Percent differences between nonfarm payroll employment benchmarks and estimates by State, March 1995-2000**

State	1995	1996	1997	1998	1999	2000
Alabama	1.1	0.1	0.6	0.3	-0.9	-1.0
Alaska	-1.0	([1])	1.0	.7	-.6	.9
Arizona	1.5	1.7	-.1	-.3	([1])	-.2
Arkansas	-.2	-.1	([1])	.2	.2	-.2
California	1.0	.3	-.2	-.2	([1])	.7
Colorado	1.2	-.8	.6	.3	.8	-.3
Connecticut	1.4	-.3	.4	.1	.2	.1
Delaware	1.1	-.2	-.3	-.5	.2	-.2
District of Columbia	-.6	-.4	-.2	.6	-.1	3.3
Florida	([1])	.2	.2	-.4	-.6	-1.1
Georgia	([1])	-.5	.5	-.1	.2	-.3
Hawaii	.1	.5	.7	.1	.3	.9
Idaho	-1.0	-.6	.5	.2	-.9	-.8
Illinois	.6	-.6	.2	.1	-.2	.6
Indiana	.7	-.1	.4	.4	-.2	.7
Iowa	.5	-.1	-.2	-.3	-.6	-.1
Kansas	([1])	-.7	-.5	-.1	-1.0	-.5
Kentucky	.4	([1])	([1])	-.1	.2	.2
Louisiana	-1.7	-.3	-.1	-.3	-.8	.8
Maine	([1])	-.7	.4	.7	.6	.7
Maryland	.9	.2	.5	1.4	.3	.2
Massachusetts	.2	-.1	.3	-.9	.1	.6
Michigan	.3	.8	.7	-.3	-.8	1.6
Minnesota	.4	.4	-.4	.3	-.2	.6
Mississippi	1.3	.4	.1	.5	1.1	-.1
Missouri	-1.0	-.3	.9	.2	.1	.2
Montana	-.2	.2	-.1	-.1	([1])	-.3
Nebraska	.1	.9	-.3	-1.2	.7	1.4
Nevada	.6	-1.3	-.4	-1.1	1.8	.1
New Hampshire	-.1	.2	-1.3	2.5	.5	.8
New Jersey	([1])	-.2	.4	-.1	([2])	1.8
New Mexico	.3	-3.0	([1])	.7	-.5	.2
New York	.5	-.3	.4	.9	.8	.2
North Carolina	.2	.3	([1])	-.4	.4	.1
North Dakota	-.2	-.6	-.9	.1	([1])	.7
Ohio	.7	-.4	.4	.2	.5	.8
Oklahoma	.6	.2	-.3	1.0	-.7	-.5
Oregon	-.6	-.2	-.1	-.9	-1.3	.2
Pennsylvania	.4	.1	-.3	.5	.7	1.2
Rhode Island	1.0	-1.4	.3	-.1	-.4	1.0
South Carolina	.4	.1	1.1	-.2	-.1	([1])
South Dakota	-.1	-2.0	.2	.1	.4	-.7
Tennessee	.4	-.8	.6	-.2	.5	.5
Texas	([1])	-.5	1.3	.4	.1	.4
Utah	.4	-.3	.8	-.7	([1])	.2
Vermont	.2	-.3	-.6	1.1	-.4	.9
Virginia	-.1	.1	.5	-.8	.6	.7
Washington	-.4	.3	.6	.3	-.1	1.1
West Virginia	.1	-.2	-.2	-.2	-.3	.8
Wisconsin	.9	.5	-.4	-.2	1.0	.7
Wyoming	.3	-1.1	.5	1.6	1.4	1.9

[1] Less than 0.05 percent.
[2] Data for New Jersey were not benchmarked in 1999, due to the unavailability of universe counts for that State.

Table 3. **Benchmark revisions for total nonfarm employment in metropolitan statistical areas (MSAs), March 2000**

Measure	All MSAs	MSAs grouped by level of total nonfarm employment			
		Less than 100,000	100,000 to 499,999	500,000 to 999,999	More than1 million
Number of MSAs	272	80	132	33	27
Average absolute percentage revision	1.1	1.4	1.0	0.8	0.8
Range	-4.3 : 6.0	-4.3 : 5.0	-3.4 : 6.0	-1.2 : 3.6	-1.2 : 2.8
Mean	.3	.3	.3	.4	.5
Standard deviation	1.4	1.8	1.3	1.1	.9

mates for both the national and State and metropolitan area data is shown below in exhibit 1. The phase-ins are concurrent with the annual CES benchmark revision publications.

The March 2003 phase-in for all remaining service-sector industries coincides with the transition from the 1987 SIC classification structure to the NAICS 2002 structure.

Seasonal adjustment

Coincident with the benchmark adjustments, seasonally adjusted employment data by State and major industry division were revised from 1996 forward to incorporate updated seasonal adjustment factors. BLS uses a two-step seasonal adjustment process for adjusting State nonfarm payroll employment estimates. This process uses UI seasonal trends to adjust the benchmark historical data, but incorporates sample seasonal trends to adjust the current sample-based estimates in the post-benchmark months. By accounting for the differing seasonal patterns of the benchmark data and the sample-based estimates, this technique yields an improved seasonally adjusted series for analyzing over-the-month employment change. Revised seasonally adjusted nonfarm payroll employment data for all States and the District of Columbia for the 1996-2000 period are available on the Internet. Data for the most recent 13 months are regularly shown in table B-7 of this publication.

Additional information

State and area annual averages for 1998-2000 by major industry are published in this issue, along with a detailed listing of the area definitions. Historical State and area employment, hours, and earnings data are available at **http://www.bls.gov/datahome.htm**, the BLS Internet site. Users may access the data via Anonymous FTP, Series Report, or Selective Access at this address. Any questions on how to access the data through the Internet should be directed to *labstat.helpdesk@bls.gov*. Inquiries for additional information on the methods or estimates derived from the CES survey should be sent to: U.S. Bureau of Labor Statistics, Room 4860, 2 Massachusetts Avenue, NE, Washington, DC 20212-0001. The telephone number is (202) 691-6559; fax (202) 691-6820. The e-mail address is *DATA_SA@bls.gov***.**

Exhibit 1. **CES redesign implementation phase-in schedule of probability-based estimates**

Major industry division	National data	State and area data
Wholesale trade	June 2000	March 2001
Mining, construction, and manufacturing	June 2001	March 2002
Transportation and public utilities; finance, insurance, and real estate; and retail trade	June 2002	March 2003
Services	June 2003	March 2003